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Killing Begets Killing: Evidence from a Bug-Killing Paradigm that Initial Killing Fuels Subsequent Killing

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Abstract

Killing appears to perpetuate itself even in the absence of retaliation. This phenomenon may occur in part as a means to justify prior killing and so ease the threat of prior killing. Additionally, this effect should arise particularly when a killer perceives similarity to the victims, because similarity should exacerbate threat from killing. To examine these ideas we developed a bug-killing paradigm in which we manipulated the degree of initial bug-killing in a "practice task" in order to observe the effects on subsequent self-paced killing during a timed "extermination task." In Studies 1 and 2, for participants reporting some similarity to bugs, inducing greater initial killing led to more subsequent self-paced killing. In Study 3, after greater initial killing, more subsequent self-paced killing led to more favorable affective change. Implications for understanding lethal human violence are discussed.

Killing Begets Killing: Evidence from a Bug-Killing Paradigm that Initial Killing Fuels Subsequent Killing

The course of human history has been replete with incidents of mass and protracted killing. In conflicts throughout the world, violence and carnage seem to fuel further violence and carnage. Killing often furthers killing in the context of retribution, wherein cycles of retaliation provoke mounting inflictions of death (e.g., Pruitt, 1998; Baumeister, 1996). Yet killing may also beget more killing because of motivations that are not retributive in nature. In particular, theorists and researchers (e.g., Staub, 2002; Lifton, 1986; Darley, 1992; Gross, 2006) have suggested that the act of killing may provide its own "fuel" for subsequent killing as part of a perpetrator's psychological efforts to justify his or her own morbidly violent actions.

The idea that killing might "feed" on itself—that is, instigate motivations for further killing—is illustrated in instances of predominantly one-sided killing, such as genocide, in which initially limited killings escalate into progressively bigger massacres (Charny, 2002; Harff, 2002). Other support for this idea is provided by laboratory demonstrations showing that incremental increases in aggression facilitate further and more severe obedience-instigated aggressive acts (Milgram, 1974). Research has also demonstrated a self-initiated or voluntary tendency toward elevations in aggression over time (e.g., Buss, Booker, & Buss, 1972; Geen & Stonner, 1973; Bandura, Underwood, & Fromson, 1975; Zimbardo, 1973; Goldstein, Davis, & Herman, 1975). In so-called "aggression machine" studies, where participants act as "teachers" administering electric shocks to "learners," the duration, intensity, and/or frequency of the shocks administered tends to drift upwards over the course of successive trials—often in the absence of incentive or pressure to increase the aggression (Goldstein, Davis, & Herman, 1975).

For obvious reasons, however, laboratory procedures to date have not permitted direct and systematic investigation of why killing promotes further killing. Existing research methodologies for studying aggression surely afford some insight into the psychology of killing (e.g., Berkowitz et al., 1962; Buss, 1961; Carlson, Marcus-Newhall, & Miller, 1989; McGregor et al., 1998; Russell et al., 1996), and although many of the processes involved in aggression may in fact be similar to those we propose, the act of killing—taking life—is unique among forms of aggression in its permanence and impact. The person killed cannot be brought back to life, nor can the loss to those who loved the victim be rectified. Perhaps as a consequence, killing and the threat of killing have historically been extremely important in affecting the course of history, particularly in the context of assassination, revolution, oppression, war, terrorism, and genocide.

In the present research, we have therefore endeavored to directly study killing behavior and its psychological underpinnings using a procedure in which participants believe they are killing a number of bugs in a self-paced extermination task. To investigate the hypothesis that killing begets killing, we examined whether manipulating the number of bugs killed during an initial "practice" trial would determine the number of bugs subsequently killed in a self-paced trial, and whether such an effect is moderated by the threat of killing a target perceived as similar to the perpetrator.

Willful killing as a response to threat

Theoretical accounts (e.g., Lifton, 1986; Kressel, 1996) suggest that the will to further killing can stem from attempts to cope with guilt and concerns with negative implications for one's character that initial or prior killing may trigger. The notion that killing can pose this kind of psychological threat to perpetrators is well supported (e.g., Baum, 2004; Lifton, 1974). For example, investigation into armed conflicts throughout history consistently makes clear the great initial difficulties soldiers have firing upon an enemy (Marshall, 1947; Grossman & Siddle, 2000). Furthermore, in a study investigating U.S. soldiers engaged in

combat during the Vietnam War, those who killed showed more severe Post Traumatic Stress Disorder symptoms than those who did not kill, and this effect remained after statistically controlling for self-reported intensity of battle experience (MacNair, 2005).

To the extent that killing behavior provokes psychological discomfort or threat in the killer, engaging in killing behavior may elicit defensive responses to cope with that threat. In particular, individuals who kill may become motivated to counteract the negative emotional consequences of their morally discrepant behavior. Such efforts may be understood as attempts to reduce cognitive dissonance (Festinger, 1957). Moreover, the literature on dissonance reduction suggests that one way to keep at bay the psychological discomfort resulting from commitment to counterattitudinal behavior is to view such behavior as justified (Brehm & Cohen, 1962), leading to subsequent maintenance or increases in the frequency of that behavior. Thus, perpetuation of killing may be motivated in part by efforts to cope with the psychological threat engendered by prior killing. Lifton illustrates this ironic and harrowing psychological process:

> "We [Nazis] have gone so far now that we have no way out." There are two possible implications here: the moral principle that the evil could not be undone; and the psychological principle that, having maintained a death factory for a period of time, one felt impelled to continue its function. The psychological point is that atrocity begets atrocity: continuing to kill becomes psychologically necessary in order to justify the killing and to view it as other than it is. (Lifton, 1986, p.213)

Initial killing in conflicts, however, often occurs with some form of external justification. As war-criminal trials often reveal (Arendt, 1964), and as Milgram's investigations of obedience further support (Milgram, 1974), people frequently kill initially in response to orders or in response to pressure from peers. And according to cognitive dissonance theory, the stronger this external justification, the less we might expect arousal of dissonance and threat. Yet the undeniable fact of personal responsibility for carrying out a killing and the irrevocable commitment such an act entails (the dead cannot be brought back) likely make it difficult for individuals to attribute their behavior solely to the influence of a legitimizing authority or to otherwise easily resolve the psychological discomfort that such behavior induces.

Moreover, killing in conflicts only rarely occurs in response to a direct threat on one's life (e.g., at gunpoint; Kessel, 1996). Instead the pressures to kill are more subtle, though no less powerful. They come from pressure to fit in, to do one's duty or one's work as a soldier, and to maintain esteem in the eyes of peers (e.g., Kessel, 1996; Lifton, 1986). Thus, individuals who are initially compelled by some pressure to kill may later attempt to justify such unsavory behavior—"to view it as other than it is"—resulting in the willful perpetuation or increase in killing. In sum, one prominent response to the psychological threat associated with an initial act of killing may be to justify such action through continued, willful killing.

Target similarity as a source of threat from killing

Though we have argued that perpetrators are likely to feel some responsibility for killing—that their actions cannot be fully justified by some external force—people may nevertheless vary in their potential to experience threat from killing. One particular predisposition to experience threat from killing may stem from perceptions of similarity to the target. Similarity generally engenders positive feelings toward targets (e.g., Byrne, 1997; Galinsky & Moskowitz, 2000) and so should also increase the potential to experience threat from killing by making such action seem more ethically reprehensible. Additionally, perceived similarity to the targets of killing may increase the potential for empathy with the victims, thereby increasing the emotional effects of killing. Detailed reports from Vietnam veterans suggest that trauma and dissonance worsens when perpetrators encounter evidence that their victims are not so different from themselves and have the same basic concerns—

i.e., the dead have families too, they also carry pictures and letters from their wives and children, etc. (Lifton, 1974). To describe this relationship between trauma from killing and connectedness to the victim one V.A. psychologist explains "You recognized you did the unthinkable. You blasted away a piece of yourself, violated some trust with God..." (Baum, 2004).

Moreover, evidence suggests that threatening aspects of similarity can spur negative responding to similar others. For example, laboratory research shows that perceived similarity can elicit harsher responding towards similar others when these similar people possess negative characteristics (e.g., Eidelman & Biernat, 2003; Martens et al., 2004; Silvia, Graham, & Hawley, 2005; Taylor & Mettee, 1971). In this work, the threat of similarity stems from the implication that by association one may also be negatively characterized. This is in contrast to threat stemming from having harmed the similar other. Nevertheless, the work broadly shows that under some circumstances, similarity to others can pose a threat that motivates harsher responding in an effort to re-establish psychological equanimity.

In addition to this research, in instances of war or genocide, similarity seems frequently and intimately related to the conflict between victim and perpetrator. Perpetrators and victims are often members of highly similar communities, with similar lifestyles and who seem indistinguishable beyond some labeled difference (e.g., an armband, uniform, color, identification card, etc.). Further, conflicts with similar others, such as civil wars, seem especially brutal and persistent (e.g., Fearon & Laitin, 2003).[1]

In sum, similarity typically engenders positive feelings and responses toward targets, suggesting that perceived similarity should predispose a reluctance to kill. However, once one does kill a victim, the more similar the victim to the self, the greater may be the threat to one's psychological equanimity. Thus, perceived similarity to the target may fuel the promulgating effect of initial killing on subsequent willful killing.

The present studies

We conducted three studies to assess the idea that the degree of coerced initial killing determines the frequency of later killing as a function of perceived similarity. Killing behavior was measured as the number of small pill bugs put into a grinder during a self-paced 20-second supposed extermination task. Prior to engaging in this task, we manipulated the amount of pill bugs participants were initially directed to exterminate in a "practice" task. Further, to assess the hypothesis that increased killing behavior reflects a defense against the threat associated with killing something similar to oneself, we measured perceived similarity to bugs prior to the experiment. We predicted that the greater the perceived similarity, the more initial killing should beget subsequent self-paced killing.

Study 1

In Study 1, we tested the hypothesis that perceived similarity to insects would have a very different relationship to self-paced killing behavior depending on whether participants were first coerced to kill. Based on the idea that similarity generally engenders positive orientations towards targets (e.g., Byrne, 1997; Galinsky & Moscowitz, 2000), we hypothesized that participants who performed no initial killing would be reluctant to subsequently kill bugs during the self-paced task if they perceived the bugs as similar to themselves. However, insofar as perceived similarity increases the threat engendered by initial killing, which in turn heightens efforts to reduce this threat by way of continued killing, then killing one bug initially should eliminate or reverse this inhibitory relationship between similarity and self-paced killing.

Method

Participants

Eighty-two introductory psychology students at the University of Arizona participated to partially fulfill a course requirement. Two participants discontinued the experiment after

reading the consent form. Six participants were excluded from analyses because they expressed strong suspicion—they did not believe they were killing the bugs. This left 74 participants (35 male, 39 female).

Materials and Procedure

To assess individual differences in the extent to which participants viewed themselves as similar to bugs, we obtained a measure of perceived similarity weeks prior to the study in a mass survey session. This measure consisted of a single item asking participants to "Please rate how similar/different you think you are to small insects" on a 9-point bipolar scale ranging from *not at all similar* (1) to *extremely similar* (9). A similar question was used successfully in past research also investigating the threatening implications of similarity (Martens et al., 2004). The experimenter was blind to these ratings.

Given the non-human targets of the similarity question, we collected supplemental data to get a sense of how participants construed this question. We asked 47 people at the end of an unrelated study to respond to this similarity item, and if they rated their similarity as greater than 1, to briefly describe "in what way do you see yourself as similar to them?" Thirty-three people rated their similarity as above 1 on the scale. Of these, 25 reported essentially that bugs are living too—that we are part of the same evolutionary process and have similar basic needs, such as for shelter, food, to survive, and to protect offspring. Four people described their similarity in terms of also being small in an overwhelmingly big universe. Four people did not respond.

Cover story and extermination machine. One or two participants arrived in the laboratory and were told the study concerned how people in various roles deal with different animals. The experimenter described that "in this particular session today, we'll be looking at the role of exterminators who deal with bugs. So one thing I want everyone to know is that the study does involve engaging in a short bug extermination task." Participants were informed that afterward they would complete questionnaires asking about their experience performing the task. Each participant was then ushered into a private cubicle and asked to read and sign a consent form if they wished to continue.

Each participant was escorted from the cubicle to another cubicle containing materials and equipment for the extermination task (See Fig. 1). Once within the extermination cubicle, the experimenter told the participant that he/she would be familiarized with the extermination task. On a desk was the purported extermination machine, which was composed of a stainless steel coffee grinder with the safety interlock top removed and a single piece of brass tubing inserted through the side of the removable bowl assembly. The tube was curved at its base so that the length of it extended vertically several inches above the grinder, giving the appearance of a chute leading directly from the tube tip to the steel blades concealed within the lidded grinder. At the tip of the tube rested a white plastic funnel into which bugs could easily be dropped. Inserted at the base of the tube was an unseen stopper, which prevented bugs from actually entering into the vicinity of the grinder blades. The apparatus was fitted with an activation button, which, when depressed, initiated the grinder such that the blades could be heard and felt to spin with strong force. Torn bits of paper were planted within the grinder, so as to simulate the sound of grinding bugs.

Initial killing manipulation. The experimenter pointed to the grinder and identified it to the participant as an extermination machine. The experimenter explained that though exterminators generally use poison sprays to treat pest problems, use of such sprays is not permitted inside the Psychology building for health and safety reasons, which is why participants were instead being asked to use the grinder to perform the task. In the initial-kill condition, a single pill bug was preset in a 4.5 oz, clear, lidless plastic cup placed beside the extermination machine (see Figure 1). These pill bugs, with segmented exoskeletons, measure approximately 1cm in length. After being given an opportunity to "take a look at the

bug so you know what you're working with," initial-kill participants were asked to pick up the cup and dump the one bug into the grinder and then press the activation button for at least three seconds. Participants in the no-initial-kill condition were likewise ushered into the extermination cubicle, introduced to the materials and procedure, and shown the bug preset in the cup. However, these participants did not exterminate the bug. The procedure was simply explained to them.

Each participant was then escorted back to his or her original cubicle and provided with information about the bugs. The experimenter explained that just as exterminators know about the bugs they work with, participants will read about the bugs before engaging in the extermination task. After reviewing a brief description of the bugs,[2] participants were individually guided back to the extermination cubicle. There the experimenter explained that "to give you a brief extermination experience, I'm going to ask you to put bugs into the grinder for a 20-second period." In front of participants were 20 clear plastic cups on a flat 14" X 18" plastic tray. Each plastic cup contained a single pill bug. Also in front of participants sat a digital timer preset to count down from 20 seconds. Participants were instructed to wait until the experimenter left the cubicle and closed the door, at which time they could press start on the timer and begin the task of putting the bugs, one by one, into the grinder. Participants were asked to perform the task continuously over the 20-second period, and, when time expired, to cease the timer's alarm by pressing the stop button and to activate the grinder blades for at least three seconds by depressing the activation button. Following the task, participants were guided back to their original cubicle, and the experimenter surreptitiously recorded the number of bugs the participant placed in the grinder based on the number of empty cups.

Back in the original cubicle, participants were presented with final questionnaires asking about their experience of the extermination task and perceptions of the bugs. The first page was the Expanded Positive and Negative Affect Schedule (PANAS-X; Watson & Clark, 1994) included to measure affect. Next participants responded to six questions on bipolar 9-point scales ranging from *not at all* (1) to *completely* (9). The first two were filler questions, followed by a question pertaining to perceptions of choice during the extermination task: "During the 20-second timed extermination procedure, to what extent did you feel that the number of bugs you put in was your choice?" Participants in the initial killing condition were also asked "In the first task when you 'familiarized' yourself with the extermination procedure, to what extent did you feel that putting the pill bug into the machine was your choice?" The final two questions assessed participants' perceptions of similarity to the pill bugs: "How similar do you feel that you are to the pill bugs?" and "How different do you feel that you are to the pill bugs?" These two items were highly correlated, $r = -.59$, $p < .01$. The second item was reverse coded and averaged with the first to create a composite index of post-study similarity to pill bugs ($M = 2.80$, $SD = 1.83$) that was significantly related to our mass-survey measure of similarity to insects ($M = 2.79$, $SD = 1.92$), $r = .42$, $p < .01$.

Finally, participants were thoroughly probed for suspicion and debriefed. Here the deceptive elements were fully and sensitively revealed. We stressed that they had not killed any bugs. Additionally, we explained in great detail the study's purpose and its potential applicability to real world problems. All participants were invited to express concerns about the experiment in private consultation with the experimenter. No participants reported serious concerns and many expressed that they found the experiment interesting and worthwhile.

Results and Discussion

Self-paced killing[3]

We hypothesized that with no initial killing, prior perceived similarity to bugs would lead to reluctance to kill them, and therefore to decreased self-paced killing. In the initial killing condition, however, subsequent killing is expected to function as a defense against the

threatening implications of initial killing. The relationship between prior similarity and self-paced killing should therefore be eliminated or reversed in this condition insofar as similarity contributes to perceived threat from killing and defensive responses to such threat.

To examine this hypothesis, we regressed the number of bugs placed into the extermination grinder during the 20-second self-paced task onto initial killing (0 vs. 1 bug; dummy coded), the continuous measure of prior perceived similarity to bugs (mean centered), and their interaction. Only the interaction was significant, $\beta = .50$, $SE = .46$, $t = 2.25$, $p < .05$. We plotted this interaction in Figure 2 using one standard deviation above (higher similarity) and below (lower similarity) the mean of similarity (Aiken & West, 1991). Analyses of the simple slopes indicate that, among participants who did not kill any bugs initially, the higher participants rated their similarity to bugs prior to the experiment, the fewer bugs they put into the grinder during the 20-second extermination task, $\beta = -.44$, $SE = .30$, $t = -2.99$, $p < .01$. However, among participants who killed one bug initially, this inverse relationship was eliminated such that higher prior similarity no longer predicted fewer bugs killed during the 20-second task, $\beta = .07$, $SE = .36$, $t = .42$, $p = .68$. These results suggest then that greater perceived similarity to bugs prior to the experiment led to decreased self-paced killing in the absence of an initial kill, but that following an initial kill, this inhibiting effect of similarity on self-paced killing disappeared.

To examine the data differently, we also tested the effects of initial killing for those higher (1 SD above) and lower (1 SD below) in perceived prior similarity to bugs. Consistent with our reasoning that the threat of killing a similar target may drive the effect of initial killing on subsequent killing, we predicted an increase in self-paced killing due to initial killing only among higher similarity participants. Accordingly, among those with higher prior similarity ratings, one initial killing led to more subsequent self-paced killing than no initial killing, $\beta = -.35$, $SE = 1.24$, $t = -2.17$, $p < .05$. Among those with lower prior similarity ratings, however, initial killing did not affect subsequent self-paced killing, $\beta = .17$, $SE = 1.24$, $t = 1.04$, $p = .30$. These results are consistent with the idea that more prior perceived similarity makes an initial kill particularly threatening, leading to increases in killing that may help justify the initial behavior.

Ancillary analyses

Choice. We set up the timed 20-second killing task so that we could measure self-paced and relatively voluntary killing. As a check on the degree to which participants perceived more choice during the self-paced task, we compared the choice ratings for the 20-second task to the choice ratings for the initial killing task for those participants in the initial killing condition. A 2-way (choice: initial killing vs. 20-second killing) repeated measures ANOVA showed that, as predicted, participants perceived the number of bugs they killed during the 20-second task as more a function of their own choice ($M = 7.06$, $SD = 2.21$) than their killing during the initial practice task ($M = 4.76$, $SD = 2.95$), $F(1,32) = 13.43$, $p < .01$. This analysis suggests that the degree of killing during the 20-second task was conducted in a relatively self-initiated or self-paced manner, as compared to the initial killing. Further, the 20-second task choice ratings were on average well above the midline of the 9-point scale, further suggesting that this task allowed us to measure the degree of self-paced killing.

Affect. To examine the effect of our independent variables on affect we computed an overall basic affect score for each participant from the PANAS-X (Watson & Clark, 1994) presented just after the self-paced killing task. To do so, we subtracted the basic negative affect subscale from the basic positive affect subscale. Larger numbers, therefore, reflect more positive mood. We regressed these overall basic affect scores onto initial killing, prior similarity, and their interaction. Only an effect for initial killing emerged, $\beta = -.30$, $SE = .24$, $t = -2.61$, $p < .05$. People who killed one bug initially expressed more negative affect afterwards ($M = .09$, $SD = 1.03$) than those who did not kill initially ($M = .70$, $SD = .92$),

perhaps because engaging in two killing tasks engenders more negative affect. We found no relationship between prior perceived similarity and affect, $p > .80$, but such a relationship would only be expected to emerge directly after the initial killing. Once higher similarity participants have engaged in the self-paced killing, they have presumably behaved in such a way as to minimize or defend against the threat.

Study 2

In Study 1 we found that with no initial killing, participants who perceived themselves as more similar to bugs killed fewer bugs during the self-paced 20-second extermination task. This supported our prediction that perceived similarity to targets would imbue the act of killing with increased potential for threat, leading to a greater reluctance to kill. In contrast, higher similarity participants who performed an initial kill were more likely to subsequently kill during the self-paced task than were higher similarity participants who did not kill initially. This finding supported our prediction that perceived similarity can fuel defensive responses to initial killing.

In this initial experiment, however, we did not observe a reversal of the relationship between perceived similarity and killing after an initial kill. That is, among those participants who made an initial kill, greater perceived similarity did not significantly predict greater killing—a result that would support the strong form our central hypothesis. We suspected that engaging in one initial kill might have increased the defensive function of subsequent killing enough to reduce the inhibitory effect of similarity on killing but not enough to reverse the relationship. By this logic, further increasing the quantity of bugs killed in an initial task might increase the defensive function served by the self-paced killing among those for whom killing bugs is threatening. In other words, to the extent that similarity makes killing threatening, with increased initial killing, greater similarity should come to predict even greater subsequent self-paced killing. Consequently, in Study 2 we upped the degree of initial killing to five bugs in order to examine whether this increased initial killing would lead higher similarity participants to kill significantly more during the self-paced task than those who kill only one bug initially.

Method

Participants and design

Fifty-eight introductory psychology students at the University of Arizona participated to partially fulfill a course requirement. One participant discontinued the study after reading the consent form. One participant was excluded from analyses because he did not follow directions. Three participants were excluded because they expressed severe suspicion that they were not killing the bugs. This left 53 participants (20 male, 33 female).

Materials and procedure

The materials and procedure were identical to those of Study 1, with the following exceptions. The quantity of bugs initially killed was again manipulated during the introduction to the materials and procedure, but participants were randomly assigned either to initially dump a single pill bug into the grinder or to dump five pill bugs, one at a time, into the grinder. Additionally, the experimenter's instructions for the 20-second extermination task differed slightly from Study 1. In Study 2 the experimenter instructed participants simply to "put bugs in to the grinder for the 20-second period," and so omitted the instruction to perform the task "continuously." This was omitted to provide more freedom to participants during the self-paced killing. As in Study 1, the index of post-study similarity to pill bugs ($M = 2.98$, $SD = 1.86$) was significantly related to our pre-test measure of similarity ($M = 2.64$, $SD = 1.47$), $r = .33$, $p < .05$.

Results and Discussion

Self-paced killing

To test our hypothesis that higher similarity participants will exhibit an increase in self-paced killing as a function of greater initial killing, we regressed the number of bugs killed during the 20-second task onto initial killing (1 vs. 5; dummy coded), the continuous measure of prior perceived similarity to bugs (mean centered), and their interaction. A main effect for initial killing emerged, $\beta = .32$, $SE = .96$, $t = 2.54$, $p < .05$. Participants led to kill five bugs initially went on to kill more bugs during the self-paced 20-second task ($M = 8.42$, $SD = 3.94$) than participants led to kill only one bug initially ($M = 6.00$, $SD = 3.36$).

Qualifying this effect was the predicted initial killing by prior similarity interaction, $\beta = .26$, $SE = .66$, $t = 2.04$, $p < .05$. As in Study 1, we plotted this interaction (Figure 3) using one standard deviation above and below the mean of similarity. Analyses of the simple slopes indicated that, just as in Study 1, among participants led to kill one bug initially, there was no relationship between prior similarity and the number of bugs killed during the 20-second task, $\beta = -.03$, $SE = .44$, $t = -.15$, $p > .85$. However, among those participants led to kill five bugs initially, the higher their prior similarity ratings, the more they killed during the 20-second task, $\beta = .50$, $SE = .49$, $t = 2.60$, $p < .05$. Thus, the inhibitory effect of prior similarity on self-paced killing observed when no initial kill took place (see Study 1) was completely reversed when participants were induced to kill five bugs initially.

We also examined this interaction by testing the effects of initial killing for those higher and lower in prior perceived similarity to bugs. Among those with higher prior similarity ratings, killing five bugs initially led to more subsequent self-paced killing than killing one initially, $\beta = .58$, $SE = 1.37$, $t = 3.24$, $p < .01$. Among those with low prior similarity ratings, initial killing did not affect subsequent self-paced killing, $\beta = .06$, $SE = 1.36$, $t = .34$, $p = .74$.

These results confirm our hypothesis that, among those participants higher in prior perceived similarity, increasing the amount of initial killing (beyond that in Study 1) promotes even more subsequent self-paced killing. In conjunction with Study 1, these findings suggest that, among higher similarity participants, increasing initial killing fuels subsequent killing in an effort to defend against the threat posed by the initial killing.

Ancillary Analyses

Choice. As in Study 1, we compared the 20-second choice ratings and the initial killing choice ratings. A 2-way (choice: initial vs. 20-second) repeated measures ANOVA showed that participants perceived the number of bugs they killed during the 20-second task as more their own choice ($M = 7.53$, $SD = 1.75$) relative to their killing during the initial practice task ($M = 4.77$, $SD = 3.05$), $F(1, 52) = 36.20$, $p < .01$.

Affect. As in Study 1, from the PANAS-X (Watson & Clark, 1994) presented just after the self-paced killing, we computed an overall basic affect score for each participant. We regressed these overall affect scores onto initial killing, prior perceived similarity, and their interaction. The interaction did not reach significance, $p > .25$, nor did the main effects, ps $> .10$, suggesting that measuring affect after the self-paced killing alone might not allow us to assess the effect of self-paced killing on affect. To detect this defensive function of self-paced killing, we would need to measure the change in affect from just before the self-paced killing to just after it. Therefore, in Study 3 we assessed affect both just before and just after the self-paced killing in order to examine whether more self-paced killing improves affect only in those people who kill five bugs initially.

Study 3

In Studies 1 and 2, we hypothesized and found that greater initial killing fuels subsequent self-paced killing among higher prior similarity participants. This supported the idea that elevated rates of killing in part reflect a defense employed when killing poses a threat to the killer. Additionally, to the extent that such a threat is present, defending against it may have beneficial affective consequences. In Study 3, we therefore tested the degree to

which engaging in such killing while under high threat (i.e., higher similarity), would have affective benefits for the perpetrator. In other words, if the higher levels of killing observed in Studies 1 and 2 reflect an effort to justify the initial killing of a similar target, then the more individuals in a high initial killing condition engage in self-paced killing, the less may be the emotional costs of their killing.

To test this hypothesis in Study 3, we recruited people with some perceived similarity to bugs and assessed affect both just before and just after the self-paced killing task. We predicted that among those who killed five bugs initially, more self-paced killing would have affective benefits. In other words, if with more initial killing (five bugs), subsequent killing functions increasingly as a defense against the threat of killing, then the more people choose to kill during the self-paced task, the less negative affect they should experience. If subsequent killing serves as less of a justificatory defense for those who kill only one bug initially, then subsequent killing should not yield emotional benefits.

Participants

In Studies 1 and 2 we found no effects on voluntary killing among participants low in prior perceived similarity to bugs. This is consistent with our reasoning that killing bugs should generally pose little threat to these participants, and therefore should not lead to defense in the form of increased self-paced killing. Thus, in Study 3, we recruited only participants who expressed some degree of similarity—who rated their similarity to insects above one (roughly two-thirds of participants in Studies 1 and 2).

Thirty-two introductory psychology students at the University of Arizona participated to partially fulfill a course requirement. One participant was excluded from the analyses because she did not follow directions. Three participants were excluded because they expressed strong suspicion that they were not killing the bugs. This left 28 participants (9 male, 19 female).

Procedure

The materials and procedure were identical to those of Study 2, with the following exception. After the practice task in which we manipulated initial killing (one bug or five bugs), the experimenter led participants back to their original cubicles. He told participants that people enter the study in different moods and that to control for this, we ask participants to fill out measures that assess mood. He then provided participants with the PANAS-X to complete. This served as our baseline for affect. Once finished, the experimenter ushered the participants back into the extermination cubicle to complete the 20-second extermination task. Just after this task, upon returning to their original cubicles, participants again filled out the PANAS-X followed by the same questions presented in the prior studies pertaining to perceived choice and similarity.

Results and Discussion

Affect

The manipulation of initial killing did not influence overall affect at time 1, nor did it influence negative or positive affect separately at time 1, all *p*s > .20. However, we did find the predicted relationship between prior perceived similarity ratings and overall affect at time 1. When we eliminated one participant with an extreme score on the prior similarity measure—who exceeded the mean by more than 2.5 standard deviations (Kirk, 1995)—we found that greater prior similarity ($M = 4.04$, $SD = 1.88$) predicted more negative affect just after the initial killing task, $r = -.38$, $p < .05$. This suggests that prior similarity promoted threat as a consequence of the initial killing.

Self-paced killing

We examined whether killing five bugs initially would lead to more subsequent self-paced killing. We entered the number of bugs killed during the 20-second task into an (initial killing: 1 vs. 5) ANOVA and, replicating Study 2, we found that killing five bugs initially led

to more subsequent self-paced killing (M = 10.23, SD = 2.32) than killing one bug initially (M = 5.47, SD = 3.42), F (1, 26) = 18.02, $p < .01$ (see Figure 4).

Effect of self-paced killing on affect

To examine our hypothesis that more self-paced killing would serve as a defense against worsened affect among those who killed five bugs initially but not among those who killed only one bug initially, we computed overall affect scores from the PANAS-X (Watson & Clark, 1994) both at time 1 and time 2. Then we computed an affect change score for each participant by subtracting overall affect at time 1 from overall affect at time 2. Thus, larger and positive numbers reflect improved affect; smaller and negative numbers reflected worsened affect.

Next we computed within-cell correlations between self-paced killing and change in affect. The correlation between these variables was significant among those who killed five bugs initially, r = .66, $p < .05$—more killing during the 20-second period led to more favorable affective change, while less killing worsened affect. However, among participants who killed only one bug initially, this correlation was not significant and tended to be negative, r = -.35, p = .21. These two within cell correlations differed significantly, z = 2.70, $p < .01$. Thus these data supported our hypothesis that higher initial killing motivates subsequent killing, and are consistent with the idea that this effect emerges because subsequent killing functions to defend against threat-related emotion triggered by the initial killing.

We also examined within cell correlations between self-paced killing and positive and negative affective change scores separately (displayed in Table 1).[4] First, more killing during the self-paced task predicted increased positive affect among those who killed five bugs initially, r = .67, $p < .05$, but not among those who killed one bug initially, r = -.43, p = .11. These two correlations differed significantly, z = 2.97, $p < .01$. Second, more killing predicted decreased negative affect in those who killed five bugs initially, r = -.55, p = .05, but not in those who killed one bug initially, r = .05, p = .86, although these correlations did not differ significantly, z = 1.41, p = .16. However, when we further examined the negative affect component subscales (fear, hostility, guilt, and sadness), we found the predicted pattern of relationships for guilt. More killing predicted decreased guilt in those who killed five bugs initially, r = -.59, $p < .05$, but not in those who killed one bug initially, r = .27, p = .33, and these correlations differed significantly, z = 2.23, $p < .05$. For none of the other subscales did change in affect predict killing in either condition, ps > .15. In sum, we found evidence that the amount of self-paced killing predicted both positive and negative affective change, though negative affective change seemed to be specific to guilt.

General Discussion

The present studies tested and found support for the hypothesis that directing people to kill more bugs initially leads them to kill more during a subsequent self-paced task. Further, the results supported the prediction that such increased self-paced killing emerges when the initial killing generates psychological threat in the perpetrator due to the perpetrator's perceived similarity to the target. Studies 1 and 2 showed that increased self-paced killing due to more initial killing only emerged among people who perceived themselves as similar to bugs. In Study 1, without any initial killing, more prior perceived similarity to bugs predicted the killing of fewer bugs in the self-paced extermination task; but this relationship was eliminated when participants were initially led to kill one bug. Study 2 demonstrated that elevating the number of bugs initially killed to five caused participants higher in perceived similarity to bugs to kill more than those who did not perceive themselves as similar. Study 3 examined the affective consequences of self-paced killing among participants higher in perceived similarity. This study showed that, among participants who killed only one bug initially, the amount of subsequent self-paced killing did not significantly

influence change in affect. However, with more initial killing (five bugs), the more bugs participants killed during the self-paced task, the less negative affect and more positive affect they reported. Thus, killing more in the self-paced task appeared to provide an affective benefit.

The results of Study 3 pertained to *change* in affect from time 1 to time 2; participants did not express more negative emotion at time 1 after killing five bugs than after killing one. It is therefore not entirely clear that an affective manifestation of threat from killing five bugs (as opposed to one) provoked the higher rate of self-paced killing observed in Study 3. One possible reason that no difference in negative affect as a function of amount initially killed was observed could be that, immediately after the initial killing task, participants instantly began rationalizing or justifying their behavior, helping to partly reduce affective manifestations of threat.

In a supplementary study, we therefore investigated the potential for increased threat in a manner that would reduce the impact of immediate defensiveness on responses. Specifically, 77 students from the same participant pool drawn from in all three studies read a description of the basic procedure, which varied only in whether the person would be instructed to kill one or five bugs. We then asked these participants to indicate how they thought others confronted with the procedure would feel in terms of reluctance, perceived ethicality, discomfort, upset, tenseness, and guilt on nine-point scales. A composite measure of perceived threat yielded an alpha of .90. Consistent with the idea that killing five bugs arouses more threat than killing one, participants who read that the task involved killing five bugs thought others would experience more threat-related feelings ($M = 4.39$, $SD = 1.73$) than did participants who read that the task involved killing one bug ($M = 3.53$, $SD = 1.95$), $F(1, 75) = 4.16$, $p < .05$.

The procedures employed in this supplementary study were hypothetical, which introduces both a limitation and a strength. The limitation is that the results reflect participants' expectations about level of threat rather than what actually occurs if one does the killing. Undoubtedly, with respect to perpetrating violence, people have difficulties knowing or predicting how they or others will respond (e.g., Milgram, 1974). The strength is that, because it was hypothetical and not self-relevant, this study enabled us to examine the anticipated impact of killing one versus five bugs in the absence of any motivation to defend against the threat of actually doing the killing. Further, it may be that what is most important here is how people think they will react, or how people would expect to feel. In other words, it may be that the threat in this particular situation has to do with the *potential* for experiencing negative affect. This supplemental finding thus provides some evidence that killing five bugs is likely to engender more threat than killing one bug, supporting the idea that the higher self-paced killing observed in Studies 1 through 3 stemmed from defensive efforts to reduce potential negative affective consequences of greater initial killing.

Although the findings from the present studies support our core hypotheses, future research should more specifically examine the affective and mediating processes involved in these effects. The self-report affect measure in Study 3 seemed sensitive to detecting affective change, but did not detect absolute differences between more and less initial killing. One might even wonder whether killing five bugs is less threatening or traumatic than killing one (see, for example, recent evidence that learning of multiple people suffering may arouse less empathy than learning of only one person suffering; Slovic, 2007). And indeed, more self-paced killing reduced negative affect in Study 3. But it may be too that increasing killing has a paradoxical effect; that as it eases negative affect, it at the same time digs one into an even deeper hole. If increased killing defends against trauma, it seems at the same time to increase the magnitude of the unethical act if acknowledged, thereby increasing threat in the form of the potential for negative affect. To better understand these processes, it may be useful to

examine the mediational impact other forms of affect (e.g., disgust, shame) and the potential for experiencing them (e.g., Greenberg et al., 2003), and to employ more subtle indicators of affect, such as implicit cognitive (e.g., lexical decision task using affect-relevant words) or physiological (e.g., facial EMG) measures, which are less vulnerable to defensive responding.

Killing begets killing: Possible alternative explanations

Possible alternative explanations exist for the basic finding that greater initial killing predicts greater subsequent killing. For example, killing may beget killing because greater initial killing simply primes people to kill more later (e.g., Bargh & Chartrand, 1999). People may associate the task with more or less killing based on their initial "practice" experience with the extermination procedure. This association may then steer them towards more or less killing in similar future tasks. But this perspective cannot account for the interactions in the present studies between perceived similarity and initial killing. Specifically, the findings that increased killing was observed only among participants who perceived higher similarity to the bugs suggest that psychological threat rather than mere cognitive association was responsible for the increased self-paced killing. Further, increased self-paced killing after more initial killing served to improve mood, again consistent with the notion that the psychological function of the greater killing observed constitutes more than an automatic priming outcome.

Another possible alternative explanation for the effect of initial killing on subsequent killing is that more initial killing desensitized people, breaking down the psychological barriers that otherwise inhibit killing behavior (e.g., Bandura, 1973; Grossman & Siddle, 2000). This hypothesis would predict that individuals who perceive higher prior similarity should be most affected by increased initial killing—similarity seems normally to produce a barrier against or inhibition against killing, as we observed in Study 1 under conditions of no initial killing. It therefore follows that desensitization should minimize or eliminate this inhibitory effect. Indeed, in Study 1 we find exactly this pattern. With one initial kill, higher similarity participants kill as much as low similar participants, who to begin with should be freer from the psychological barrier to killing. But Study 2 suggests that with even more initial killing—five bugs—higher similarity leads participants to willfully kill *even more* than those low in perceived similarity. Thus, the desensitization hypothesis does not explain this apparent motivational property of similarity—that after having increased initial killing to five bugs, higher similarity predicts killing at a pace that exceeds that of low similarity.

Limitations and strengths of this paradigm

These studies were conducted to address the conditions under which individuals may voluntarily increase killing behavior, and we hope that the present findings will contribute to future discourse and research on this topic. However, it is critical to emphasize that the present studies examined the killing of bugs, targets that of course differ from humans (although victims of genocide are often referred to by perpetrators as vermin or cockroaches). And the mode of killing in this paradigm is very different from the way both bugs and humans are killed in most contexts. Thus, we encourage great care in interpreting the potential application of the current findings to conflict involving killing of humans.

Keeping such concerns in mind, the present results do appear consistent with observations from real-world conflict and killing as well as research pertinent to these issues (e.g., Browning, 1992; Browning, 2004; Charny, 2002; Staub, 2002; Kressel, 1996; Gross, 2006). For example, Becker (1973) noted that the Nazi SS coerced recruits to commit increasingly severe atrocities to increase their subsequent willingness to commit further atrocities, a phenomenon referred to as Blutkitt (blood cement). As a more recent egregious example, the former Liberian leader, Charles Taylor, forced boys to kill their parents in order to recruit them into his militias bent on continued slaughter and upending the established older generations in power (Polgreen, 2006).

Moreover, because humans are at many levels perceivably more similar to one another than they are to bugs, the tendency for similarity to feed the threat of killing and defensive responses to such threat may be even greater in the context of inter-group conflicts, especially since such conflicts often involve groups that share physical and cultural similarities. If the threat of killing bugs triggers justificatory defense mechanisms driving additional killing of bugs, then it may be anticipated that killing other humans may elicit even more intensified defensiveness and killing. That is, most people would have greater difficulty killing a human than killing a bug, suggesting that justificatory efforts to cope with an initial kill of another human being may give rise to much more powerful urges than those elicited in the present studies. And indeed, real world killing can reach startling and almost inconceivable levels. Gourevitch (1998, p.133), for example, breaks down the numbers from the Rwandan genocide: "Take the best estimate: eight hundred thousand killed in a hundred days. That's three hundred and thirty-three and a third murders an hour—or five and a half lives terminated every minute."

We should note, however, that our model for how killing perpetuates itself may also be applicable for non-killing instances of harming others. When any form of harm is performed severely and often enough, we would expect people to justify their behavior with continued aggression. What may differ, though, between these instances and those involving killing, is how quickly people reach a point of no return—a point at which one cannot back down and admit one's wrongdoing. Because killing another living being is so completely irrevocable and severe, we suspect that it more readily lends itself to justification through further violence than lesser forms of harm-doing in which other paths toward psychological repair are more feasible. Now that we have developed a paradigm for studying killing, specifying the characteristics that distinguish killing from other forms of aggression, as well as identifying similarities in these processes, is an important challenge for future theoretical and empirical work.

Though we here examine killing bugs in order to make inferences about killing humans, laboratory research generally makes inferences about killing from research that has little to do with killing. What this work offers, then, is a new methodological approach that should add to the existing literature on killing and conflict. It opens the door to experimental investigations into killing, and moreover, into mass killing. One hope, then, is that the present experimental investigations and future extensions will provide contributions that can, together with other forms of study (i.e., observation, interviewing, theorizing, introspecting, historical analysis, etc.), converge toward a more complete understanding of the psychological processes involved.

Conclusion: Implications for reducing the promulgating effect of killing on subsequent killing

The current findings suggest the unappealing possibility that initial killing among humans may effect quite dramatic increments in killing—an idea with potentially important implications for a functional role of early intervention in violent conflict. For instance, such insight may be of great value to agencies that monitor the precursors and emergence of deadly conflict, such as genocide watch agencies. Knowing the social and psychological conditions under which small acts of violence and killing are likely to perpetuate themselves may facilitate the development of preemptive interventions intended to avoid the ballooning of a few violent acts into mass killing and protracted carnage. Moreover, the present findings suggest a more detailed attending to perceived similarities among antagonistic groups—that contrary to what may seem intuitive, a greater sense of connection between groups may increase the risk for conflict spiraling out of control.

Additionally, the present work may have implications for tactics in dealing with individual contributors to killing. If the mechanism proposed here is correct—that the threat elicited by initial killing contributes to subsequent driven killing—then perhaps this threat

can be alleviated or redirected for constructive rather destructive purposes. For example, it may be that bringing threat-related emotions into awareness—and with these emotions, awareness of one's wrongdoing—allows for alternative and constructive ways to defend against or expiate these emotions (e.g., Freud, 1966; Pyszczynski et al., 1993; Pennebaker, 1997). Some research suggests that focusing people on their negative emotions can stem increases in hostility otherwise fueled by these very emotions (Berkowitz & Troccoli, 1990; Finman & Berkowitz, 1989). Perhaps this kind of awareness can transform destructive and avoidant-type emotional experiences, such as those embodied by shame, into more reparative-type emotional experience, such as guilt (Tangney & Dearing, 2002). A real world application of these kinds of ideas might be found in South Africa, where the Truth and Reconciliation Commission allows those who were perpetrators of injustice under Apartheid a chance to gain amnesty if they come forward and disclose their knowledge of and involvement in atrocities.

Finally, it is worth considering the potential effects of disseminating these kinds of psychological and behavioral research findings to the leaders and soldiers living in nations that are particularly vulnerable to violent conflict. Perhaps if potential perpetrators and their leaders better understood the effects of killing on the psyche and on subsequent tendencies toward killing, they would consider other options with due deliberation before charging down the blood-soaked path of escalating violence. If the evidence is clear that people are most able to resist coercion to kill before they have begun or in those very initial stages—that after this point changing the course becomes more and more psychologically intolerable—then perhaps this knowledge can help bolster people's courage to resist in these precarious and critical early moments. With estimates showing over two-hundred million people dead from conflict and atrocities in this past century alone (Leitenberg, 2003), we hope this work will contribute to efforts that address these difficult problems and that expand the ways we think about and deal with these unthinkably destructive phenomena.

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NOTES

1. We thank an anonymous reviewer for suggesting the relevance of civil wars to our hypothesis.
2. Participants in Studies 1 and 2 read a description emphasizing similarities or differences between the pill bugs and humans. This manipulation did not work; it had no effects on the dependent measures and failed to predict our manipulation check pertaining to similarity, *ps* > .10, whereas our pre-measure ratings of similarity did predict the manipulation check , $r = .38$, $p < .001$. Thus, for the sake of simplicity, we excluded this variable from final analyses and do not discuss it further.
3. In some other existing experimental paradigms, men on the whole tend to aggress more than women; however, these effects do not emerge consistently (Geen, 1998). In the studies presented here, we consistently found trends for men to kill more, but they never approached significance, and gender did not interact with initial killing and prior similarity, all *p*s > .40. Therefore, gender was not included in the analyses.
4. We additionally examined the interaction between initial killing and similarity on affect change in regression analyses. The interaction effect with overall affective change was significant, $p < .05$; the interaction with positive affective change was significant, $p < .05$; the interaction with change in guilt was marginally significant, $p = .07$; the interaction with negative affect as DV was not significant, $p = .16$.

Table 1. Study 3: Correlations between self-paced killing and affective change as a function of initial killing.

	Change in overall affect	*Change in positive affect*	*Change in negative affect*	*Change in guilt*
Initial killing Condition				
1 bug	-.35	-.43	+.05	+.27
5 bugs	+.66*	+.67*	-.55*	-.59*

NOTE: * $p < .05$

Figure Captions

Figure 1. The extermination cubicle with the bug-killing machine and one pill bug in its plastic cup.

Figure 2. Study 1: Self-paced killing (bugs killed during the 20-second extermination task) as a function of initial killing and prior perceived similarity.

Figure 3. Study 2: Self-paced killing (bugs killed during the 20-second extermination task) as a function of initial killing and prior perceived similarity.

Figure 4. Study 3: Self-paced killing (bugs killed during the 20-second extermination task) as a function of initial killing.

Figure 1.

Figure 2.

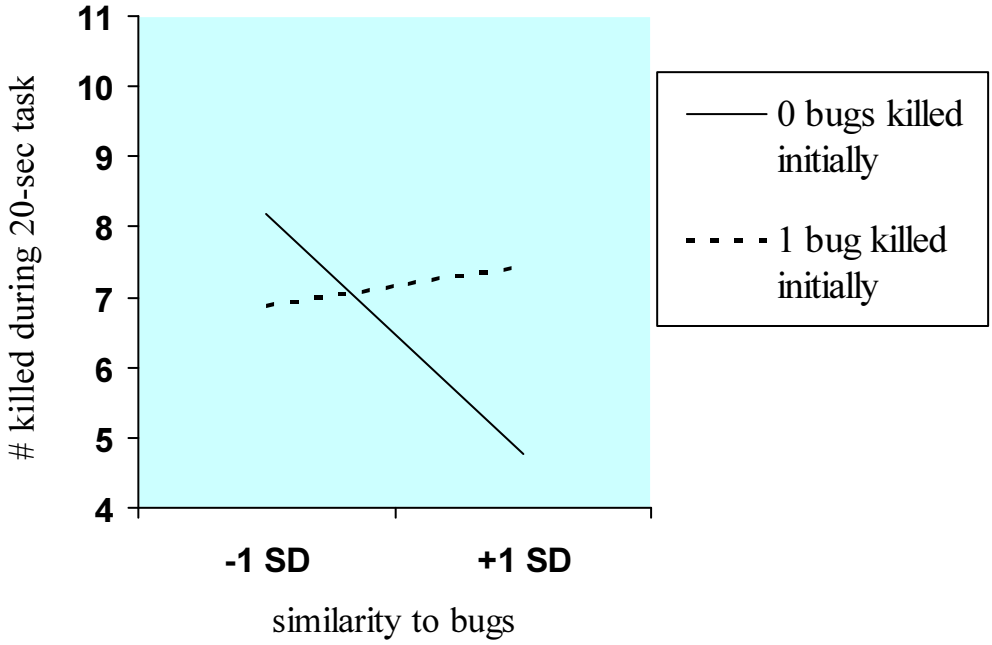


Figure 3.

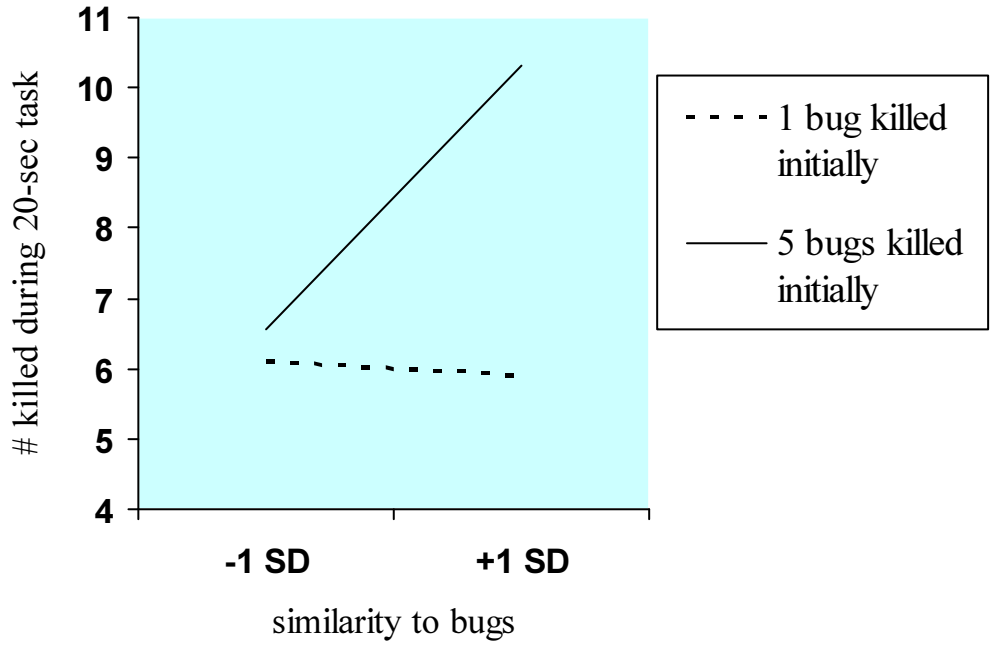
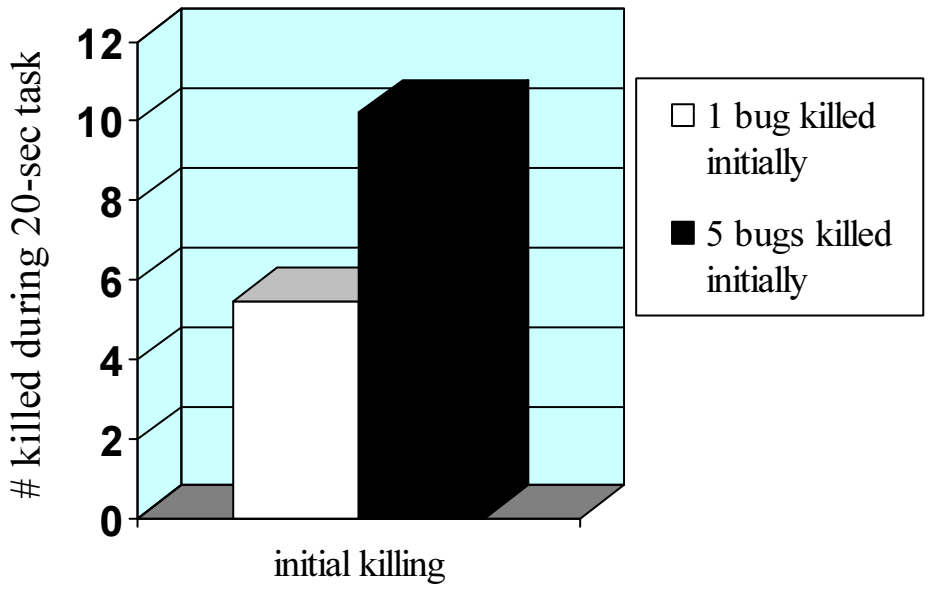


Figure 4.


killed during 20-sec task
12
10
8
6
4
2
0
initial killing
1 bug killed initially
5 bugs killed initially